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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/632,873

08/01/2003

Yunsang Kim

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55649

7590

07/03/2006

MOSER IP LAW GROUP / APPLIED MATERIALS, INC.

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EXAMINER

GEORGE, PATRICIA ANN

ART UNIT

PAPER NUMBER

1765

DATE MAILED: 07/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/632,873	KIM ET AL.	
	Examiner	Art Unit	
	Patricia A. George	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 April 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims 1-2

- 4) ☒ Claim(s) ~~1-10~~ is/are pending in the application.
- 4a) Of the above claim(s) 14-20 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 3, 7-8, 13 is/are allowed.
- 6) ☒ Claim(s) 1, 2, 4-6 and 9-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

The 35 USC § 112 rejection of claims 1-13 is withdrawn.

### ***Declarations***

Three declarations submitted by inventors currently employed by Applied Materials were received and filed March 31, 2006. As was exhibit A to the declaration invention submitted to Applied Materials, Inc. Patent Department on or before June 14, 2002. All 35 USC § 103 and 103 rejections in the office action filed 12/20/2005 have been withdrawn, as a result of the received declarations. A new grounds of rejection is offered below.

### ***Claim Objections***

Claim 10 objected to because of the following informalities: Typo in line 1, "clam". Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4, 5, 6, 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Han et al. (US 6,281,135).

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Han et al. disclosed a process for selectively remove (i.e. selectively etching) charged particles from low-k dielectric (i.e. dielectric constant less than 4) (see the abstract) by plasma (ab.) etching with: a fluorine rich gas such as CF<sub>4</sub> (col.3, lines 44-50); nitrogen (i.e. N<sub>2</sub> - see col.3, line 61); and a hydrogen-rich hydrofluoropcarbon gas is selected from the group consisting of C<sub>x</sub>H<sub>y</sub>F<sub>z</sub> wherein x ranges from 1 to 4, y ranges from 0 to 9 and z ranges from 1 to 10, which encompasses the range claimed by applicants. Han et al teaches the low-k dielectric material is situated into a plasma etch chamber, where it is plasma etched (col.3, lines 20-40).

Hans teaches use of the etching gas mixture further comprises an inert gas selected from the group consisting of argon, and helium, as in claim 12 (col.7, lines 25-30).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. (US 6,281,135 of Aug. 5, 1999), as applied to claims 1-2, 4, 5, 6, 12 above, and further in view of Zhang et al. (6,291,357)

Han is silent as to the configuration of the apparatus used for the selective etch, as applicants' limitations of claim 9: capacitively coupled RF such that a substantial DC bias exists between pedestal and plasma; and claim 10: applying bias to the pedestal, source power to the top electrode; and the source power having a greater frequency.

As to claim 9, Zhang et al. teaches the apparatus used to etch is capacitively coupled RF (col.8, line 9-10 then ) such that a substantial DC bias exists between pedestal and plasma (see figure 6 and summary section), as in claim 9.

As to claim 10, Zhang teaches applying bias to the pedestal and source power to the top electrode (see fig. 6) where the source power at the electrode can have higher frequencies than the bias, because a range is provided (see columns 7 through 8, starting at line 54, ending at line 54).

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to modify the invention of selective etching, as Han et al., to include the apparatus parameters, as Zhang, because Zhang teaches such a configuration will reduce variations in the etch rate, provide more predictable and uniform etched shapes, which is desirable for manufacturing (see background).

***Claim Rejections - 35 USC § 103***

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Han et al. (US 6,281,135 of Aug. 5, 1999), as applied to claims 1-2, 4, 5, 6, 12 above, and further in view of Collins et al. (5888414).

Han is silent as to the configuration of the apparatus used for the selective etch, as applicants' limitations of claim 11: maintaining a plasma of etching gas mixture comprises applying a controlled rate (i.e. slowly) rotating magnetic field in the chamber.

Collins et al. (5888414) teaches maintaining a plasma of etching gas mixture comprises applying a controlled rate (i.e. slowly) rotating magnetic field in the chamber, as in claim 11.

It would have been obvious to one of ordinary skill in the art at the time of invention was made, to include slowly rotating magnetic field in the chamber, as Collins et al., when etching, as Han et al., because Collins et al. teaches rotating the field reduces the non-uniformity gradient, a process improvement (col.2, lines 26-28).

***Allowable Subject Matter***

Claims 3, 7-8, and 13 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

As to claim 3, the closest prior art, Zhu et al. of 2002/0111036, which teaches selectively etching a low-k dielectric material at 3000 angstroms per minute, which is much less than the etch rate of higher than about 4000 angstroms per minute, as applicants' limitation.

As to claims 7, 8, and 13 no prior art was found that disclosed or suggested the ratio of volumetric flow rates as in applicants claims 7, 8, and 13.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Patricia (Patty) George whose telephone number is (571)272-5955. The examiner can normally be reached on weekdays between 7:00am and 4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571)272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



PAG  
06/06

Patricia A George  
Examiner  
Art Unit 1765

Binh Tran